

THE SCOTTISH ANTARCTIC EXPEDITION.

We print herewith the last communication received from the Scottish Antarctic Expedition:

STANLEY, FALKLANDS,
ANTARCTIC SHIP SCOTIA, *January 24, 1903.*

DEAR SIR: I beg to acknowledge, with thanks, receipt of your esteemed favor of November 6 last and the copies of the MONTHLY WEATHER REVIEW. Please convey to the Chief of Bureau my best thanks for his gift. We leave here to-morrow for the Weddell Sea,¹ pushing south along the thirtieth parallel of west longitude and wintering in the ice. We do not expect to return here before February or March of next year. I hope to be able to contribute something to your magazine. We shall concentrate on kite work as much as circumstances permit, and have a complete outfit of meteorographs, kites, etc., on board. There is, we believe, some possibility of the ink freezing, as we have not the new ink, containing tinsol, on board.

(Signed)

R. C. MOSSMAN,
Meteorologist.

THE CLIMATES OF GEOLOGICAL AGES.

One of the most interesting branches of climatological study consists in the effort to reason backward from the known climates of various portions of the world in the present epoch to what those climates must have been in earlier ages, when animals and plants differed somewhat from those of to-day. This study involves quite as much geology as meteorology, and is not likely to be solved without a due regard to both these elements. The latest contribution consists in a broad treatment of the subject by Professor Dr. Fritz Frech, of Breslau, who has considered the geological and paleontological conditions that must be satisfied, and shows plainly how our present ignorance of many points prevents logical argumentation on the subject. In conclusion he says:

It scarcely needs to be stated that I am far from considering the problem of the distribution of heat in past geological ages as solved by the present studies. Whoever has busied himself for many years with the reconstruction of the ancient oceans and continents will best know how great are the gaps in our knowledge of this subject and what surprises are in store for us; for instance, as the results of that research in the antarctic regions which is just now beginning. I have discussed the purely physical side of the problem and can easily imagine that further

¹The southern extremity of the South Atlantic, explored by Captain Weddell about 1820.

modifications are possible; that, for instance, there exist still other relations between the enormous eruptions of masses that sometimes cover whole continents and the changes in the climatic temperature. But I consider it certain that there is a parallelism between the maxima of terrestrial temperatures and the maxima of volcanic activity, and that there is a simultaneity between the glacial epochs and the minima of eruptive activity. The general conclusions are as follows:

1. The question as to the origin of the prevailing warmer climates in the geological past can not be separated from the problem of the glacial epochs.
2. The variations in the percentage of carbonic acid gas in the atmosphere afford the physical explanation for the differences of the warmer and colder climates in the geological past; a higher percentage of carbonic acid gas corresponds to a higher temperature.
3. Since carbonic acid gas is consumed by organic and chemical processes, therefore, volcanic exhalations constitute the only source to counterbalance this consumption.
4. Consequently, through all geological time a diminution of eruptive activity corresponds to a diminution of carbonic acid gas and a fall of temperature; such a fall of temperature twice produced a glacial epoch; namely, at the end of the paleozoic epoch and at the beginning of the present geological epoch. Every maximum of volcanic eruptions corresponds to a clearly observable rise in temperature.
5. Independent of this factor, that influences the climate of the whole earth, are the distribution of land and water, as also the consequent direction of the currents of wind and ocean, which are of great importance in determining the character of the climate.
6. On the other hand, the uniform warm climate that has prevailed during by far the greater number of geological periods can not be explained by any other distribution of the quantity of heat that we now receive.
7. All the older periods of the earth's history up to the end of the carboniferous found a warm climate fairly uniformly distributed over the earth.
8. After the close of the carboniferous period there occurred a glacial period that was principally developed in the Southern Hemisphere, but of which there are also indications in the Northern and which soon disappeared again.
9. After the consequences of this glacial epoch had been gradually overcome there again prevailed during the first two-thirds of the middle age of the earth, a uniformly tropical and subtropical climate in the central and upper dyas (or Permian strata.) From the upper Jura onwards, but especially in cretaceous times a division in the climatic zones was formed.
10. Two periods of the maximum of eruptions at the beginning and in the middle of the tertiary epoch correspond again to maxima of temperature.
11. The diminution of eruptions in the last portion of the tertiary epoch runs parallel with the diminution of heat; the glacial epoch (precisely as in the case of the paleozoic cold period) is to be recognized by an almost perfect cessation of eruptive activity, but the present epoch, by a renewed activity.

THE WEATHER OF THE MONTH.

By W. B. STOCKMAN, Forecast Official, in charge of Division of Records and Meteorological Data.

CHARACTERISTICS OF THE WEATHER FOR JANUARY.

During January, 1903, the temperature was normal in the lower Lake region; slightly below in the South Atlantic States, east Gulf States, the Ohio Valley and Tennessee, and the middle Pacific district; elsewhere it was above normal, and in the majority of these districts the mean daily excess was much more marked than in the regions where the departures showed a deficiency.

The precipitation was considerably above normal in the Florida Peninsula, and slightly above in North Dakota, the middle Plateau region, and the middle Pacific district; elsewhere it was below normal, the departures, however, amounted to less than 1 inch, except in the Ohio Valley and Tennessee where it was —1.9 inches.

The relative humidity was normal in the Middle Atlantic, South Atlantic, and west Gulf States, the Ohio Valley and Tennessee, upper Lake region, and the north Pacific district; slightly below in New England, the east Gulf States, North Dakota, the southern Plateau region, and the south Pacific district, and slightly above normal in the remaining geographical districts.

The cloudiness was slightly below the average in New Eng-

land, the Missouri Valley and middle Plateau region, and above the average in the remaining districts. The departures, however, not being very marked, except in the Florida Peninsula, and the north Pacific, and middle Pacific districts.

PRESSURE.

The distribution of monthly mean pressure is shown graphically on Chart VI and the numerical values are given in Tables I and VI.

The area of highest mean atmospheric pressure overlay the northern and middle Plateau regions, and northern and west-central California. Another area of somewhat lower mean pressure overlay the central Gulf States, and south-central Tennessee. The lowest means were in northern New England. The pressure was slightly above normal in the Rio Grande Valley and thence northward to southeastern Washington and the California coast; elsewhere it was below normal, and over the greater portion of the area of deficient pressure the departures were quite decided and were most marked in parts of the Lake region.

The mean pressure for January, 1903, increased slightly over that of December, 1902, generally west of the one hundred and fifteenth meridian. To the eastward of said meridian it

decreased, and generally with marked changes, the greatest minus departures being reported from the northern districts to the eastward of Montana.

TEMPERATURE OF THE AIR.

The mean temperature was below the normal from southwestern Pennsylvania, Lake Erie, southern Michigan, and Indiana, southward over the South Atlantic States to the Atlantic Ocean, and over the Ohio Valley and Tennessee, and east Gulf States to the Gulf of Mexico; also along the eastern and central coasts of the west Gulf States, in the northern part of the great valley of California, and on the coast of central California; elsewhere it was above normal, with very decided departures in the Missouri Valley, North Dakota, and northern slope, the departures in Montana showing a mean daily excess of 11.9° at Helena and 13.4° at Miles City. The data compiled at Climate and Crop centers from regular Weather Bureau and cooperating stations combined show a slightly greater area of deficient temperature, and the location somewhat modified; also that the amount of excess was not so great for the various States taken as a whole as when the individual stations within the State were considered. Several Montana stations report the highest January mean temperature since the establishment of the stations.

The isotherms of maximum temperature were located somewhat to the northward of their positions in January, 1902, particularly that of 80° over Florida and the west Gulf States. The area embraced within the isotherm of zero temperature, or lower, is not so extensive as it was in January, 1902. Freezing temperatures were not reported from a narrow strip along the littoral of Texas, and in parts of extreme southern and east-central and west-central Florida.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	25.9	+0.9		
Middle Atlantic	12	32.8	+0.3		
South Atlantic	10	46.5	-1.1		
Florida Peninsula*	8	59.9	+0.1		
East Gulf	9	47.5	-1.3		
West Gulf	7	48.1	+1.5		
Ohio Valley and Tennessee	11	33.9	-0.3		
Lower Lake	8	25.3	0.0		
Upper Lake	10	19.5	+2.0		
North Dakota*	8	11.4	+6.1		
Upper Mississippi Valley	11	24.8	+3.7		
Missouri Valley	11	25.7	+8.9		
Northern Slope	7	26.4	+5.3		
Middle Slope	6	34.4	+2.4		
Southern Slope*	6	40.9	+2.7		
Southern Plateau*	13	38.5	+1.5		
Middle Plateau*	9	26.4	+5.8		
Northern Plateau*	12	31.0	+8.2		
North Pacific	7	42.6	-0.2		
Middle Pacific	5	46.8	+2.5		
South Pacific	4	53.1			

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of the month was higher than the average over very nearly the entire Dominion, the only districts where a negative departure was registered being the extreme southwest counties of Ontario, and in far northern regions near Hudson's Bay, and in Athabasca, Yukon, and Cassair. The largest positive departures, between 9° and 12°, occurred in Assiniboia; westward from this territory the departure diminished to 3° at Vancouver, and eastward to 3° at Lake Superior, whence across Ontario, Quebec, and the Maritime Provinces it ranged from average to 2° above, except near Lake Erie and in the upper Ottawa Valley where it was about 1° below.

PRECIPITATION.

Data tabulated from reports from regular Weather Bureau

stations show the precipitation to have been below the normal, except in parts of the lower Lake region, New England, the Middle Atlantic, South Atlantic, Gulf States, North Dakota, and in the upper Rio Grande Valley, and from northern Utah and southwestern Idaho westward to the Pacific. The greatest excess occurred on the northwestern coast of California. Deficiencies ranging from 1 inch to 4 inches obtained in the eastern part of the west Gulf States, northern part of the east Gulf States, the Ohio Valley and Tennessee, the upper Lake region, and central Mississippi Valley. The greatest monthly amounts of precipitation occurred in the Pacific districts north of central California. Relatively large amounts are also reported from the Florida Peninsula.

The southern limit of snow on ground at the end of the month was located much farther to the northward than at the end of January, 1902, except over the Plateau and western parts of the slope regions where it was about the same, and on the Pacific coast where it extended to the southern border of Oregon.

The snow conditions in the western mountains are generally very satisfactory, and a good and ample flow of water for irrigation purposes seems to be assured for the coming crop season. During the latter part of the month the snowfall in Nevada was the heaviest since 1890, as it also was over the great Salt Lake watershed in Utah. The snowfall was deficient in the Upper Peninsula of Michigan.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		Inches.	Inches.
New England	8	3.65	92	-0.3	
Middle Atlantic	12	3.38	92	-0.2	
South Atlantic	10	3.80	90	-0.4	
Florida Peninsula*	8	5.58	194	+2.7	
East Gulf	9	4.28	81	-1.0	
West Gulf	7	2.59	74	-0.9	
Ohio Valley and Tennessee	11	2.28	55	-1.9	
Lower Lake	8	2.25	85	-0.4	
Upper Lake	10	1.19	60	-0.8	
North Dakota*	8	0.78	134	+0.2	
Upper Mississippi Valley	11	0.92	51	-0.9	
Missouri Valley	11	0.48	49	-0.5	
Northern Slope	7	0.31	51	-0.3	
Middle Slope	6	0.18	23	-0.6	
Southern Slope*	6	0.44	47	-0.5	
Southern Plateau*	13	0.35	30	-0.8	
Middle Plateau*	8	1.30	108	+0.1	
Northern Plateau*	12	1.76	81	-0.4	
North Pacific	7	8.34	94	-0.5	
Middle Pacific	5	5.65	106	+0.3	
South Pacific	4	2.08	78	-0.6	

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation did not differ much from average anywhere except perhaps very locally, and this more especially in Ontario where there were instances of positive and negative departures at stations not far distant from each other. In the eastern and northern portions of the Northwest Territories the snowfall was rather in excess of the average, but west and south it was deficient. At the close of the month snow lay to a depth of from three to five feet over the more eastern portions of Quebec, but southward over the Maritime Provinces the depth diminished to a light covering near the Bay of Fundy, and to none in western Nova Scotia; westward the depth diminished from 34 inches at Quebec to 15 at Montreal, and then to almost nil at Kingston and near the shores of Ontario and Erie, with a moderate covering over the inland counties of Ontario. In Saskatchewan and northern Alberta the depth was between 12 and 18 inches, and less farther south.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 16, 17. Arkansas, 27. California, 26, 27, 28, 30, 31. Florida, 17, 26, 28. Idaho, 25. Indian Territory, 7, 26. Kentucky, 10, 29. Maryland, 11, 20, 24. Massachusetts, 2, 3, 11, 30. New York, 11, 28, 30. North Carolina, 6, 10, 11, 20, 21, 24.